



International Journal of Orthopaedics Sciences

ISSN: 2395-1958
IJOS 2017; 3(1): 649-654
© 2017 IJOS
www.orthopaper.com
Received: 05-11-2016
Accepted: 06-12-2016

Dr. Umesh Jadhav
Department of Orthopedics,
Hardikar Hospital, Pune,
Maharashtra, India

Dr. Dhaval Gotecha
Department of Orthopedics,
Siddharth Municipal Hospital,
Mumbai, Maharashtra, India

Arthroscopic 360 degrees capsular release for treatment of adhesive capsulitis– A study of 40 cases

Dr. Umesh Jadhav and Dr. Dhaval Gotecha

DOI: <http://dx.doi.org/10.22271/ortho.2017.v3.i1j.95>

Abstract

Introduction: Adhesive capsulitis, better known as frozen shoulder is a common disabling musculoskeletal disease, characterized classically by pain and restriction in range of motion. Management of this condition is controversial, ranging from non-operative to operative interventions, all intending to decrease pain and restore joint function. Arthroscopic capsular release has emerged as an effective surgical procedure for treating adhesive capsulitis. The aim of this study was to evaluate the results of arthroscopic capsular release for adhesive capsulitis

Methods: Between February 2013 and May 2015, 40 patients underwent arthroscopic capsular release non responsive to conservative management. Patients having rotator cuff disease, osteoarthritis, history of fracture upper end humerus and bilateral adhesive capsulitis were excluded from the study. Patients were followed up for a minimum period of 11 months. Results were evaluated using Constant score, UCLA (University of California Los Angeles) and VAS (Visual Analog Scale) scoring system.

Results: The mean age of the patients was 57.1 years, with 13 male (32.5%) and 27 female (67.5%) patients. The right and left shoulder were affected in 31 patients (77.5%) and 9 patients (22.5%) respectively. 21 patients were diabetic (52.5%), 6 patients had a history of trauma (15%) whereas 13 patients had primary idiopathic adhesive capsulitis (42.5%). Post-operatively, the mean time to achieve maximum pain relief was 1.7 months, whereas the mean time to achieve maximum gain in range of motion was 2 months. Mean preoperative range of motion (Anterior Elevation/ Abduction/ External Rotation/ Internal Rotation) was 98.2°/36.3°/21.1°/13.8° whereas post-operatively it increased to 178.5°/166.8°/55.7°/48.1°. The average VAS, Constant and UCLA score was 8.7, 27.5 & 12.8, which improved to 2.3, 88.8 & 31.3 respectively.

Conclusion: The results of arthroscopic capsular release for adhesive capsulitis are encouraging and provide an effective treatment modality to provide pain relief restore joint function in cases resistant to conservative management

Keywords: Adhesive capsulitis, arthroscopy, frozen shoulder, joint capsular release, shoulder pain

1. Introduction

Adhesive capsulitis, also known as frozen shoulder, is a common musculoskeletal disease affecting the shoulder joint, characterized by pain and restricted range of motion in all directions of the shoulder, ultimately leading to a stiff shoulder [1, 2] This condition was first recognized by Duplay in 1872, referring it to as “scapulohumeral peri arthritis” [3]. In 1934, Codman coined the term ‘frozen shoulder’ for this condition, describing it as a condition affecting the shoulder with painful and progressive global restriction of range of motion with normal Xray findings and of unknown etiology [4]. Nevasier coined the term ‘adhesive capsulitis’ in 1945, associating the pathology to be due to adhesions in the joint capsule. However, this condition has been attributed to be due to synovitis and capsular contractures, rather than adhesions [5]

Adhesive capsulitis can be classified as primary (idiopathic) or secondary. The primary idiopathic form is characterized by gradual onset painful restriction of shoulder range of movement with no identifiable cause related to it. Secondary adhesive capsulitis is attributed to those patients with an identifiable risk factor, mainly diabetes mellitus, trauma or prolonged immobilization [6-9] The incidence of primary adhesive capsulitis is around 2-4% and up to 18-20% in patients suffering from diabetes mellitus. Majority of the cases fall in the age group of 40-60 years with a slight preponderance in women [10-12]

Correspondence
Dr. Umesh Jadhav
Department of Orthopedics,
Hardikar Hospital, Pune,
Maharashtra, India

Treatment of adhesive capsulitis has been a controversial issue. Over the years, many different treatment options have been described in literature, ranging from physical therapy, NSAID's (Non-Steroidal Anti Inflammatory Drugs), oral & intra-articular steroids, hydrotherapy, manipulation under anaesthesia and surgery [13, 14] Arthroscopic capsular release has gained popularity in the recent years, with identifiable success. In this study, we report our results of arthroscopic capsular release in patients with adhesive capsulitis non-responsive to conservative management.

2. Materials and Methods

Between February 2013 to May 2015, a total of 40 patients underwent arthroscopic capsular release. These patients had undergone a trial of conservative management in the form of NSAID's, physical therapy and steroids for a minimum period of 4 months, but failed to improve. All patients underwent a thorough evaluation regarding history and nature of their symptoms, thorough clinical examination and radiographic evaluation.

In history, the onset and duration of symptoms were noted and the intensity of pain, including night pain was assessed using Visual Analog Scale. Active and passive range of motion of the affected shoulder was measured w.r.t anterior elevation, abduction, external rotation and internal rotation and was compared to the unaffected side. Standard radiographs of the affected shoulder were obtained. MRI imaging was also done to rule out any intra-articular pathology. Those patients having rotator cuff disease, osteoarthritis, history of fracture of upper end humerus, history of any previous open or arthroscopic shoulder surgery, bilateral adhesive capsulitis and those patients who underwent joint mobilization or hydrotherapy were excluded from the study. Constant score and UCLA (University of California Los Angeles) score was calculated pre-operatively of every patient.

2.1 Surgical Procedure

The surgical procedure was performed in lateral decubitus position with the limb secured to a longitudinal traction device at 45° of abduction and 15° of forward flexion with 4 kg weight. General anaesthesia with interscalene block was administered to the patients. All surgeries were performed by the same operating team under the same primary operating surgeon. Before beginning the procedure, range of motion of the shoulder under anaesthesia was noted.

An 18 no. spinal needle was introduced approximately 2 cm inferior and medial to the posterolateral edge of the acromion and directed towards the coracoid process to establish the posterior portal. Approximately 20-40cc of normal saline was introduced into the shoulder joint, following which, the arthroscope was introduced through this posterior portal. Anteroinferior portal was then established by inside-out technique. A radiofrequency ablation device was introduced through the anterior portal. Rotator interval release with coracohumeral ligament release was then done (Figure 1), following which tenotomy of the long head of the biceps tendon was done (Figure 2). A thorough synovectomy was then performed with an arthroscopic shaver. Following this, anterior capsular release was undertaken from 12 o'clock position till upto 5.30-6 o'clock position with radiofrequency ablator and arthroscopic scissors. At this time, adhesions anterior and posterior to the subscapularis tendon were released. Then, arthroscope was introduced through the anteroinferior portal and the radiofrequency device was introduced through the posterior portal and the remainder of the capsular release was undertaken to achieve a full 360°

capsular release (Figure 3 & 4). At the end of this procedure, subacromial & subdeltoid bursectomy was done. Range of motion of the shoulder was noted at the end of the procedure.



Fig 1: Rotator interval Release Being Performed

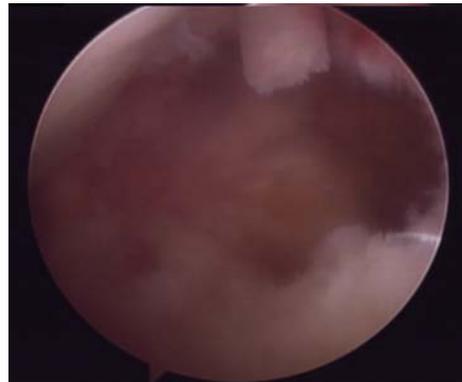


Fig 2: Long Head of Biceps Tenotomy Done

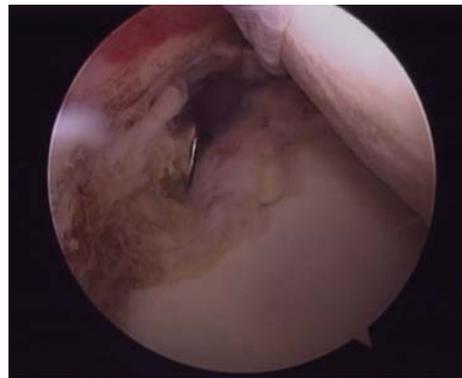


Fig 3: Posteriosuperior capsular release being done



Fig 4: Posteroinferior capsular release being done

2.2 Postoperative Protocol

Shoulder was immobilized in a forearm sling for a period of one week. However, within the week, scapular sets and pendulum exercises were encouraged. After a week, the sling was discontinued and passive range of motion exercises & capsular stretching exercises were initiated. Active-assisted and Active range of motion exercises were introduced as tolerated w.r.t pain relief. At the end of 4 weeks, strengthening exercises were begun.

3. Results

The present study included 40 patients, 13 male (32.5%) and 27 female (67.5%) with the mean age of 57.1 yrs. The right shoulder was involved in 31 patients (77.5%) whereas the left shoulder was involved in 9 patients (22.5%). Based on their etiology, 21 patients (52.5%) were diabetic, 6 patients (15%) had a history of preceding trauma whereas 13 patients (42.5%) had primary idiopathic adhesive capsulitis. The mean duration of follow-up was 16.7 months. These patient characteristics have been elaborated in detail in Table 1.

Table 1: Patient Characteristics

Sr no	Age (Yrs)	Sex	Side affected	Etiology	Duration Of Follow Up (Months)
1	53	M	Right	Diabetes Mellitus	13
2	51	F	Right	Diabetes Mellitus	15
3	61	F	Right	Trauma	12
4	55	M	Left	Idiopathic	15
5	63	F	Right	Trauma	18
6	57	F	Right	Diabetes Mellitus	18
7	50	M	Right	Idiopathic	15
8	59	F	Left	Diabetes Mellitus	11
9	56	M	Right	Diabetes Mellitus	15
10	53	M	Right	Idiopathic	13
11	49	F	Left	Trauma	18
12	64	F	Right	Diabetes Mellitus	15
13	60	F	Left	Diabetes Mellitus	14
14	59	F	Right	Diabetes Mellitus	11
15	50	M	Right	Trauma	18
16	54	F	Right	Idiopathic	21
17	62	M	Right	Diabetes Mellitus	18
18	61	F	Left	Diabetes Mellitus	20
19	55	F	Right	Idiopathic	16
20	60	F	Right	Diabetes Mellitus	15
21	64	M	Right	Diabetes Mellitus	18
22	56	F	Left	Idiopathic	19
23	52	F	Right	Trauma	21
24	54	F	Right	Idiopathic	24
25	65	M	Right	Diabetes Mellitus	13
26	52	F	Right	Idiopathic	11
27	65	F	Left	Diabetes Mellitus	18
28	50	F	Right	Trauma	15
29	58	M	Right	Diabetes Mellitus	17
30	57	F	Right	Diabetes Mellitus	20
31	54	M	Right	Idiopathic	24
32	58	F	Right	Idiopathic	21
33	61	F	Right	Diabetes Mellitus	16
34	62	M	Left	Diabetes Mellitus	18
35	60	F	Right	Idiopathic	11
36	61	F	Right	Idiopathic	19
37	57	F	Right	Diabetes Mellitus	15
38	55	F	Right	Diabetes Mellitus	18
39	59	M	Right	Diabetes Mellitus	21
40	53	F	Left	Idiopathic	19

Post-operatively, the mean time to achieve maximum pain relief was 1.7 months, whereas the mean time to achieve maximum gain in range of motion was 2 months. Pre-operative and post-operative mean shoulder range of motion has been elaborated in Table 2 and Figure 5. These patients demonstrated a statistically significant increase in shoulder motion in all 4 directions. Clinical assessment and functional

status of the patients was evaluated using Constant score, UCLA (University of California Los Angeles) score and VAS (Visual Analog Scale) scoring system. The mean pre-operative and post-operative scores have been elaborated in Table 3 & Figure 6. In our case series, none of the patients had any incidence of post-operative infection, neurovascular injury or shoulder dislocation.

Table 2: Outcomes in shoulder range of motion following arthroscopic capsular release

Period Of Evaluation	Mean Shoulder Range Of Motion			
	Anterior Elevation	Abduction	External Rotation	Internal Rotation
Pre operatively	98.2	36.3	21.1	13.8
Postoperatively (Last follow up)	178.5	166.8	55.7	48.1
P Value (Using Student t-test)	<0.0001	<0.0001	<0.0001	<0.0001

Table 3: Mean Values of Pre & Post-Operative Scoring Systems

Period Of Evaluation	Mean Values		
	VAS	Constant	UCLA
Pre operatively	8.7	27.5	12.8
Postoperatively Last follow up	2.3	88.8	31.3

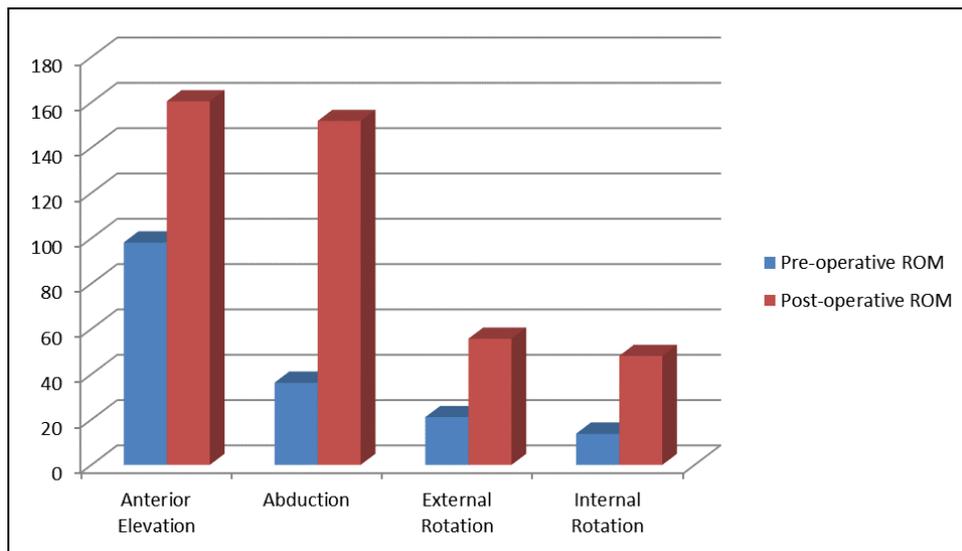


Fig 5: Mean values in Pre-operative & Post-operative shoulder range of motion

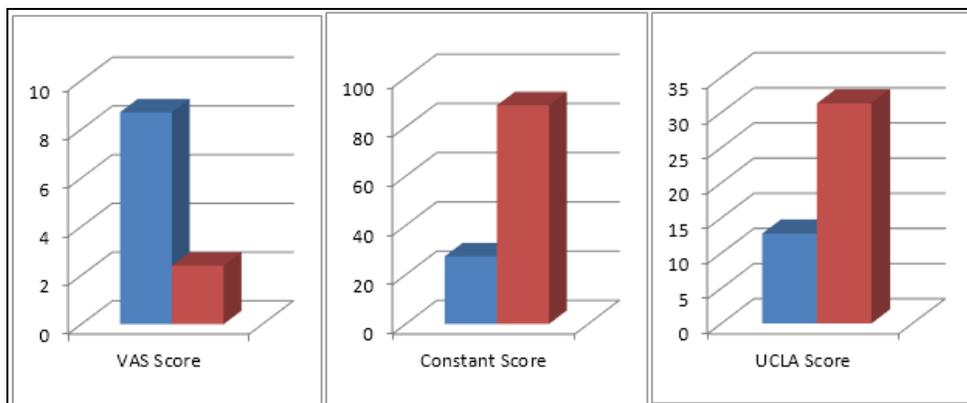


Fig 6: Pre-operative and Post-operative Score comparison in outcomes of Visual Axnalog Score (6a), Constant Score (6b) & UCLA (University of California Los Angeles) Score (6c).

4. Discussion

The pathogenesis of adhesive capsulitis is uncertain. Ozaki *et al* attributed the contracture of coracohumeral ligament and the rotator interval as the primary lesion of adhesive capsulitis.¹⁵ However, histological examination demonstrated a mixture of collagen type 2 & 3 with fibroblasts, suggesting an abnormality in production of growth factors, leading to adhesions and fibrosis.^{16,17} In our study, the mean age of the patients was 57.1 years, which was consistent with the studies performed by Ebrahimzadeh *et al* (51 years), Musil *et al* (54 years), Trsek *et al* (49 years) and Cinaret *et al* (50 years) [18-21]. In our study, females were affected more than males, which is consistent with the study performed by Ebrahimzadeh *et al*, Cinaret *et al* and Sheridan *et al* [18, 21, 22]. Arthroscopic capsular release has been shown to improve shoulder mobility and reduce pain, and has emerged as one of the most successful method for management of refractory adhesive capsulitis. In the study by Ebrahimzadeh *et al*, they showed significant improvement in VAS score, Constant score, as well as improvement in mobility and decreased pain

[18]. Lafosse *et al* demonstrated improvement in Vas Score from preoperative 7 to 1.6 and improvement in constant score from 25 to 72 [23]. Marquart also demonstrated improvement in constant scores post operatively from 21 to 92 [24]. Snow demonstrated a postoperative increase in constant score to 86 [25]. In our study the VAS improved from 8.7 to 2.3 & the constant score improved from 27.5 to 88.8, which is consistent with these studies. Oglivie-Harris *et al* recommended anterior and inferior capsular release, but not posterior release, and demonstrated their results in their case series [26]. Posterior release was added to this by studies performed by Jerosch *et al* & Snow *et al*, but showed no significant difference in the post-operative range of motion [27, 28]. Bhatia *et al* in 2013 performed a circumferential capsular release and demonstrated superior results in gain in range of motion [29]. In our study, we performed circumferential capsular release in all our patients with 80.3° gain in anterior elevation, 130.5° gain in abduction, 34.6° gain in external rotation and 34.3° gain in internal rotation. Oglivie-Harris *et al* & Pearsall *et al*, in their study released

the intra-articular portion of the subscapularis, as it acts as a restraint to external rotation [26, 30] None of their patients showed any signs of post-operative anterior instability. Jerosch *et al*, Chen *et al* & Cinar *et al* demonstrated similar results without performing subscapular release [21, 27, 31] In our study, subscapular release was not performed.

The coracohumeral ligament is the thickest part of the capsule in adhesive capsulitis, and it was released in all the patients included in our study.³² Marcos Fernandes in his study has described the aim and importance of its release to restore external rotation and relieve pain.³³ In his study, after releasing the coracohumeral ligament in all his cases, the mean gain in external rotation was 29.5°. In our study the mean gain in external rotation was 34.6°.

Subacromial decompression was done in all the patients included in our study. Based on the literature, subacromial decompression contributes significantly to pain relief. Chen *et al* performed subacromial decompression in 86% of their study population whereas Marcos Fernandes performed the same in all his patients, with significant improvement in shoulder pain [31, 33]

There are a few limitations to our study. First, our study is a retrospective case study with a small study population. Secondly, there was no control group to compare results with other methods described in literature. However, our results demonstrated significant success in subjective and clinical outcomes with arthroscopic capsular release technique.

5. Conclusion

The results of arthroscopic capsular release for adhesive capsulitis are encouraging and provide an effective treatment modality to provide pain relief restore joint function in cases resistant to conservative management.

6. References

- Nagy MT, MacFarlane RJ, Khan Y, Waseem M. The Frozen Shoulder: Myths and Realities. *The Open Orthopedic Journal*. 2013; 7(10):352-355
- Hansen EB. Periarthritis of the Shoulder. *Ann Rheum Dis* 1952; 11:2-16
- Duplay E. De la periarthrite scapulo-humérale et des raideurs de l'épaule qui en sont la conséquence. *Arch Gen Med*, 1872; 20:513-542
- Codman EA. Tendinitis of the Short Rotators. In: *The Shoulder: Rupture of the Supraspinatus Tendon and Other Lesions in or about the Subacromial Bursa*, Boston MA: Thomas Todd, 1934.
- Nevasier J. Adhesive capsulitis and the stiff and painful shoulder. *Orthop Clin North Am*. 1980; 11(2):327.
- Hand GC, Athansou NA, Matthews T, Carr AJ. The pathology of frozen shoulder. *J Bone Joint Surg*. 2007; 89(7):928-932
- Dias R, Cutts S, Massoud S. Frozen Shoulder. *Br Med J*. 2005; 332(7530):1453-6
- Moren-Hybinette I, Moritz U, Schersten B. The clinical picture of the painful diabetic shoulder- natural history, social consequences and analysis of concomitant hand syndrome. *Acta Med Scand*. 1987; 221(1):73-82.
- Zuckerman JD, Cuomo F, Rakita S. Definition and classification of frozen shoulder. *J Shoulder Elbow Surg*. 1994; 3:S5.
- Uppal HS, Evans JP, Smith C. Frozen Shoulder: A systematic review of therapeutic options. *World J Orthop*. 2015; 6(2):263-268.
- Clayton RA, Court-Brown CM. the epidemiology of musculoskeletal tendinous and ligamentous injuries. *Injury*, 2008; 39:1338-44
- Rizk TE, Pinals RS. Frozen Shoulder. *Semin Arthritis Rheum*, 1982; 11(4):440-52
- Bulgen D, Binder A, Hazelman B, Dutton J, Roberts S. Frozen shoulder: prospective clinical study with an evaluation of three treatment regimens. *Ann Rheum Dis*. 1984; 43(3):353-60
- Shaffer B, Tibone JE, Kerlan BK. Frozen shoulder: a long term follow up. *J Bone Joint Surg Am*. 1992; 74:738-46.
- Ozaki J, Nakagawa Y, Sakurai G, Tamai S. Recalcitrant chronic adhesive capsulitis of the shoulder. Role of contracture of the coracohumeral ligament and rotator interval in pathogenesis and treatment. *J Bone Joint Surg Am*. 1989; 71(10):1511-5
- Mullett H, Byrne D, Colville J. Adhesive capsulitis: human fibroblast response to shoulder joint aspirate from patients with stage II disease. *J Shoulder Elbow Surg*, 2007; 16(3):290-4
- Bunker TD, Reilly J, Baird KS, Hamblen DL. Expression of growth factors, cytokines and matrix metalloproteinases in frozen shoulder. *J Bone Joint Surg Br*. 2000; 82(5):768-73
- Ebrahimzadeh MH, Moradi A, Pour MK, Moghadam MH, Kachooei AR. Clinical outcomes after arthroscopic release for recalcitrant frozen shoulder. *Arch Bone Jt Surg*. 2014; 2(3):220-224
- Musil D, Sadovsky P, Stehlik J, Filip L, Vodicka Z. Arthroscopic capsular release in frozen shoulder syndrome. *Acta Chir Orthop Traumatol Cech*. 2009; 76(2):98-103
- Trsek D, Cicak N, Zunac M, Klobucar H. Functional results and patient satisfaction after arthroscopic capsular release of idiopathic and post-traumatic stiff shoulder. *International Orthopedics (SICOT)*. 2014; 38:1205-1211.
- Cinar M, Akpınar S, Derincek A, Circi E, Uysal M. Comparison of arthroscopic capsular release in diabetic and idiopathic frozen shoulder patients. *Arch Orthop Trauma Surg*. 2010; 130(3):401-6.
- Sheridan MA, Hannafin JA. Upper extremity: emphasis on frozen shoulder. *Orthop Clin North Am*. 2006; 37(4):531-9
- Lafosse L, Boyle S, Kordasiewicz B, Guttierrez-Arramberi M, Fritsch B, Meller R. Arthroscopic arthrolysis for recalcitrant frozen shoulder: a lateral approach. *Arthroscopy: The journal of Arthroscopic & Related Surgery*. 2012; 25(1):19-23.
- Marquardt B, Witt KA, Liem D, Steinbeck J, Potzl W. Arthroscopic Bankart repair in traumatic anterior shoulder instability using a suture anchor technique. *Arthroscopy*. 2006; 22(9):931-6.
- Snow M, Boutros I, Funk L. Posterior arthroscopic capsular release in frozen shoulder. *Arthroscopy*. 2009; 25(1):19-23
- Oglivie-Harris DJ, Biggs DJ, Fitisalos DP, Mackay M. The resistant frozen shoulder: Manipulation versus arthroscopic release. *Clin Orthop Relat Res*, 1995; (319):238-48
- Jerosch J. 360 degrees arthroscopic capsular release in patients with adhesive capsulitis of the glenohumeral joint- indication, surgical technique, results. *Knee Surg Sports Traumatol Arthrosc*. 2001; 9(3):178-86.
- Snow M, Boutros I, Funk L. Posterior arthroscopic capsular release in frozen shoulder. *Arthroscopy*. 2009; 25(1):19-23.

29. Bhatia S, Mather RC, Hsu AR, Ferry AT, Romeo AR, Nicholson GP *et al.* Arthroscopic management of recalcitrant stiffness following rotator cuff repair: A retrospective analysis. *Indian J Orthop.* 2013; 47(2):143-149.
30. Pearsall AW, Osbahr DC, Speer KP. An arthroscopic technique for treating patients with frozen shoulder. *Arthroscopy.* 1999; 15(1):2-11
31. Chen J, Chen S, Li Y, Hua Y, Li H. Is the extended release of the inferior glenohumeral ligament necessary for frozen shoulder? *Arthroscopy.* 2010; 26(4):529-35.
32. Omari A, Bunker TD. Open surgical release for frozen shoulder: surgical findings and results of the release. *J Shoulder Elbow Surg.* 2001; 10(4):353-7
33. Marcos Rassi Fernandes. Arthroscopic treatment of adhesive capsulitis of the shoulder with minimum follow up of six years. *Acta Orthop Bras.* 2015; 23(2):85-9.